Development and Psychopathology (2022), 1–6
doi:10.1017/S0954579421001863

CAMBRIDGE UNIVERSITY PRESS

Regular Article

Effects of childhood trauma in psychopathy and response inhibition

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Abstract

Childhood trauma is linked to impairments in executive function and working memory, thought to underly psychological disorders including depression and posttraumatic stress disorder. Research demonstrates that childhood trauma can partially mediate posttraumatic stress disorder in those with executive function deficits. Despite a link with executive function deficit, psychopathy as a consequence of trauma is yet to be studied in this context. The present study investigates the possibility of a relationship between childhood trauma, psychopathic traits, and response inhibition. Eighty participants were tasked to completed the Childhood Traumatic Events Scale (Pennebaker & Susman, 2013), Levenson's Self-Report Psychopathy Scale (Levenson et al., 1995), and Flanker task of response inhibition (Eriksen & Eriksen, 1974). Scores of trauma exposure, psychopathic traits, and reaction times in the Flanker task were measured. Regression analysis revealed no significance for trauma exposure in predicting psychopathic traits ($p = .201$) and response inhibition ($p = .183$), indicating that childhood trauma does not strongly predict susceptibility to psychopathic traits or response inhibition deficits. These findings form an important basis on which to build a further understanding of the consequences of childhood trauma exposure, specifically in terms of understanding how specific cognitive functions may be influenced and providing a clearer understanding of how psychopathic traits develop.

Keywords: childhood trauma; executive function; psychopathic traits; psychopathy; response inhibition

(Received 21 July 2021; revised 25 November 2021; accepted 22 December 2021)

Research acknowledges that exposure to trauma during childhood may lead to long-term neurological (De Bellis, 2001), cognitive (De Bellis, 2001; Twamley et al., 2009), and psychological impairments (Op den Kelder et al., 2017). A commonly studied potential consequence of childhood trauma exposure is posttraumatic stress disorder (PTSD); A wide range of studies note the increased risk of developing PTSD as a result of childhood trauma exposure (Alisic et al., 2014; Malarbi et al., 2017; Op den Kelder et al., 2017). Research in this area is dominant in aspects of treatment, comorbidity, and prevalence rates. One study found around a third of children exposed to traumatic childhoods to develop PTSD in later life (Alisic et al., 2011). Similarly, meta-analyses report 16% of all trauma-exposed children develop PTSD (Alisic et al., 2014). One of the most cited studies in this area reports young people exposed to complex trauma in childhood were more likely to display cognitive deficits, leading to higher levels of posttraumatic symptoms in later life (Op den Kelder et al., 2017).

Psychopathic traits

Though psychopathy itself is not a common psychological disorder; <1% in the general population (Coid et al., 2009; Tuvblad et al., 2016), psychopathic traits are common (Coid et al., 2009). Psychopathic traits include a lack of emotional sensitivity and empathy, impulsiveness, superficial charm and insensitivity to punishing consequences (O'Donnell & Hetrick, 2016). Childhood adversity including physical neglect and family disruption are strongly associated with high levels of psychopathic traits (Marshall & Cooke, 1999; Piquero et al., 2012). Similarly, childhood sexual abuse, emotional abuse, physical abuse, and neglect are associated with higher prevalence of psychopathic traits (Craparo et al., 2013; Graham et al., 2012) emotional abuse and neglect. Existing research evidence suggests that exposure to trauma through various abuse in childhood may play a relevant role in the development of psychopathic traits. However, research to date has relied heavily on institutionalized samples, where psychopathy is over-represented at 7%–8% (Coid et al., 2009). This does not provide a clear understanding of the prevalence of this relationship in the general population.

Response inhibition

The evidence base shows that trauma has profound effects on cognitive functioning, particularly executive functions (Bucker et al., 2012), working memory (Castaneda et al., 2008), and emotional regulation (Dunn et al., 2018; Pechtel & Pizzagalli, 2011; Zou et al., 2013). However, the sampling frame for a number of existing studies is a major limitation of the research. Where effects were found between executive functions and childhood trauma experience, the effects are often partly mediated by either depressive (Kaczmarczyk et al., 2018), posttraumatic (Malarbi et al., 2017; Op den Kelder et al., 2017), or schizophrenic (Li et al., 2017) diagnoses. As a result, although there is evidence for a relationship, this

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Cite this article: Bedwell, S. A. and Hickman, C. (2022). Effects of childhood trauma in psychopathy and response inhibition. *Development and Psychopathology*, 1–6, https://doi.org/10.1017/S0954579421001863

may be more complex than that of a linear one and needs to be explored further.

Although there is evidence for a general role of trauma in executive function, the specific role of trauma in response inhibition remains to be fully understood. Response inhibition refers to a suppression of actions or behaviors that are inappropriate in a given context, or that interfere with goal direction (Mostofsky & Simmonds, 2008). Support for an association derives from multilevel meta-analyses utilizing 322 effect sizes and 55 studies in the area that found an overall small to medium effect size (Op den Kelder et al., 2017), and this was corroborated by Ji and Wang (2018), who also claimed adverse childhood experiences had a possibility rate of 56% in predicting inhibition ability. A recent study supported a strong association between childhood traumatic experience and response inhibition to aggressive behavior (Madole et al., 2019). These findings imply that trauma-exposed children have lower levels of executive functions that may play a role in later psychological functioning when considered in terms of aggression Further research is required to establish the presence of this role in response inhibition outside of aggressive behaviors.

A possible link between childhood trauma exposure, susceptibility to psychopathic traits, and response inhibition deficits is yet to be investigated thoroughly. Some research suggests an interaction between these variables. One body of research showed executive functioning deficits to mediate PTSD diagnoses in children exposed to trauma (Op den Kelder et al., 2017) and in schizophrenic diagnoses (Li et al., 2017). Deficits in these functions have also been linked to trauma-exposed children with conduct disorder diagnoses, which is often regarded as a precursor to psychopathy (Fairchild et al., 2009). A recent study by Madole et al. (2019) found childhood traumas and poor response inhibition to account for 16% variance in aggression displayed in early adulthood. This could suggest that there is a role for mediation between variables in relation to childhood trauma exposure and response inhibition that should be investigated. Early childhood traumatic experiences may adversely impact an individual's cognitive systems, particularly in relation to emotional and inhibition control, which in turn may pose a risk factor for the development of a range of psychopathological disorders.

Present study

Response inhibition as a type of executive functioning is yet to be investigated using nonclinical samples. In addition, the current replication crisis in psychology (Camerer et al., 2018) puts into perspective that the small number of significant effects and small effect sizes reported must be corroborated with further research to ensure their validity. Therefore, the present study aimed to establish if there are links between trauma experiences during childhood, response inhibition performance, and psychopathic traits. Specifically, it was hypothesized based on previous evidence from the literature that H1. Those who report higher levels of childhood trauma will score higher on measures of psychopathic traits and H2. Those who report higher levels of childhood trauma will score lower on measures of response inhibition.

Method

Design

The present study employed a within-subjects quasi-experimental design whereby all participants completed the Flanker task (Eriksen & Eriksen, 1974), Levenson's Self-Psychopathy Scale (Levenson et al., 1995), and Childhood Traumatic Experience Scale (Pennebaker & Susman, 2013) on the Gorilla experimental platform. Childhood experience, specifically in relation to traumatic events as described in the CTES took the role of the independent variable in the study. Participants' level of response inhibition was also measured.

Participants

Eighty participants from a psychology student population at a UK University were recruited through a volunteer sample. Participants were awarded with four research credits upon completion of the study. Those who had suffered a medically diagnosed traumatic brain injury, diagnosed with a traumatic psychological disorder, or were going through a traumatic experience at the time of research were discouraged from participation due to the sensitive nature of the study and possibility of confounding variables in relation to cognitive functioning (Anderson et al., 2012; Dikmen et al., 2009).

Materials

Childhood Traumatic Events Scale

Pennebaker and Susman's (2013) Childhood Traumatic Events Scale was completed to establish the frequency, type, and participants' level of confiding of traumas experienced in childhood for the purpose of comparison and data analysis. The Childhood Traumatic Events Scale consists of six questions related to six types of childhood trauma: death of a very close friend or family, major upheaval between parents, sexual abuse, violence, illness or injury, and any other major upheaval significantly impacting life or personality. Examples of questions included "Prior to the age of 17, did you experience a death of a very close friend or family member? If yes, how old were you?" Participants' responses were recorded using a seven-point Likert scale which ranged from 1 = not at all traumatic to 7 = extremely traumatic. The CTES has been validated by a range of studies in the field (Marcusson-Clavertz et al., 2017; Miu et al., 2017; Wamser-Nanney et al., 2018).

Levenson's Self-Report Psychopathy Scale

The Levenson's Self-Report Psychopathy Scale (LSRP) measures perception of their personality in relation to psychopathic traits (Levenson et al., 1995). The LSRP contained 16 items related to primary psychopathy, whilst the remaining 10 items assessed secondary psychopathy (Levenson et al., 1995). This self-report method contained 26 questions related to psychopathic traits scored on a five-point Likert scale which scored using strongly disagree, disagree, neutral, agree, and strongly agree. Examples of question included were "Before I do anything, I carefully consider the possible consequences" and "I enjoy manipulating other people's feelings." Cronbach's alpha for the LSRP was 0.82 overall (Falkenbach et al., 2007).

Eriksen's Flanker task

The Flanker task (Eriksen & Eriksen, 1974) assesses response inhibition. The task consists of five practice and 20 test trials. In each trial, there was a pattern of five fish against a white background – which has been shown to result in higher retention rates in immediate recall tasks (McConnohie, 1999). The patterns were manipulated in nine of the 20 trials to show incongruent patterns of fish; and the participant had to correctly identify the correct direction of the central fish in the pattern as quickly as they could by pressing either the *F* key which indicated left or *J* which

indicated right. The trials had a mixture of exposure times which ranged from 400 to 800 ms. Gorilla experimental software was used to generate the task and record the reaction times and number of correct responses for each trial. Cronbach's alpha for the task was reported as 0.53 for congruent−incongruent reaction times.

Procedure

Participants who agreed to take part were led to a web screen which presented the participant information sheet and consent form. Once consent was established, participants were led to a screen which contained the CTES for them to complete. Participants then completed the LSRP before they were directed to the Flanker task. All tasks included instructions for the participant before they were able to complete them. Upon completion of these tasks, participants were shown an on-screen debrief. Ethical approval was granted by the University's Ethics Committee on 3rd December 2019. The BPS ethical code of conduct was adhered to for the duration of the study.

Results

Sixty-five of the eighty participants reported at least one incidence of childhood trauma.

Hypothesis 1: Those who report higher levels of childhood trauma will score higher on measures of psychopathic traits.

Childhood trauma experience was assessed by totaling the scores of "intensity of childhood trauma" and levels of "confiding in others." Higher frequencies of trauma, and subjective levels of their intensity, and lower scores of confiding resulted in higher trauma scores overall. Participants' self-reported psychopathy scores were calculated by the sum of 26 responses scored on a scale from one to five: with higher scores indicating a higher psychopathy level.

To explore whether childhood traumatic experience is a significant predictor of psychopathy score, a linear regression analysis was applied (Table 1). The results of the regression analysis revealed that the full model did not significantly predict psychopathic traits ($F(1,78) = 1.67$ $p = .201$). More specifically, childhood trauma (CTES score) did not significantly predict psychopathic trait score ($B = .14$, $t = 1.29$, $p = .201$). For those who experienced no trauma at all during childhood, the average psychopathy score on the LSRP was marginally smaller. This indicates a possible weak relationship between childhood trauma exposure and psychopathic traits. These findings indicate that experience of childhood trauma does not predict development of psychopathic traits.

Hypothesis 2: Those who report higher levels of childhood trauma will score lower on measures of response inhibition.

To explore whether childhood traumatic experience could predict response inhibition score, a linear regression analysis was applied (Table 1). The results of the regression analysis revealed that the full model did not significantly predict response inhibition ($F(1,78) = 1.80$, $p = .183$). More specifically, childhood trauma (CTES score) did not significantly predict response inhibition (Flanker task mean reaction time) ($B = .079$, $t = 1.342$, $p = .183$). These findings indicate that experience of childhood trauma does not predict development of response inhibition.

Table 1. Linear regression analyses for childhood trauma (CTES score) as a predictor of psychopathy childhood trauma (CTES score) as a predictor of response inhibition (mean reaction time)

Variables	*B*	*β*	*t*	Sig.
CTES score as a predictor of psychopathy	.090	.144	1.29	.201
CTES score as a predictor of response inhibition	.79	.150	1.342	.183

Discussion

The present study aimed to determine the presence of a predictive relationship between childhood trauma and response inhibition as well as childhood trauma and psychopathic traits. It was predicted that those who had reported higher levels of trauma during childhood would display higher self-reported psychopathy scores using the LSRP (Levenson et al., 1995), and also have a longer reaction time to correct answers on the Flanker task (Eriksen & Eriksen, 1974). These predicted effects were not found. Our analyses indicated no significant predictor effect of childhood trauma on psychopathic traits or response inhibition. Therefore, contrary to suggestions from the previous literature, our findings show no evidence of a link between self-reported childhood trauma exposure and response inhibition or psychopathic traits.

Arguably, the most notable contribution that the present study offers is that the findings further support and strengthen the related literature of the prevalence of childhood trauma in the population. Sixty-five of the eighty participants reported at least one incidence of childhood trauma, which conforms to many large-scale studies that report prevalence rates of between 15% and 80% (Alisic et al., 2008). As the results from the current study favor the higher estimate, it could therefore be argued that the prevalence of childhood trauma may in fact be higher than the current literature suggests. This therefore opens avenues for further study to validate the accepted knowledge.

There is a large body of literature that demonstrates a link between childhood trauma, neurobiological abnormalities, and development of executive functions (Courchesne et al., 2011; McCrory et al., 2012; Pechtel & Pizzagalli, 2011; Perlstein et al., 2001; Wilson et al., 2011; Zhou et al., 2015). Evidence also suggests that children with historical experiences of abuse and PTSD perform poorly on measures of executive function compared with typical children and are more impulsive than their matched peers (De Bellis et al., 2009). The findings we have presented here offer a new insight into this relationship, suggesting that at least some aspects of executive function may be left unimpaired by traumatic experience, or at least an individual's own perception of their traumatic experience. Further research should explore the differences and impact of retrospective self-perceived trauma versus trauma measured or observed by others.

Working memory has been found to be impaired in trauma-exposed children (Bucker et al., 2012). Maltreated children have also been found to have poorer emotional regulation than controls (Eturk & Gor, 2018; Pechtel & Pizzagalli, 2011; Zou et al., 2013). Emotional regulation is also regarded as significant in psychopathy research (Casey et al., 2013), suggesting a possible link between childhood trauma, psychopathy and executive functioning. Being that there is wide support for the effect of childhood trauma in a variety of executive functions, it has long been assumed that response inhibition, as a form of executive functioning, would be affected by trauma exposure. Childhood trauma exposure was previously found to account for over half of the variation in response inhibition (Ji & Wang, 2018). This research was further strengthened by the corroboration of similar studies (Madole et al., 2019) and meta-analyses of 55 studies that supported a small to medium effect size of −0.46 (Op den Kelder et al., 2017).

Therefore, it is plausible that trauma exposure in childhood can in fact impair an individuals' response inhibition in later life. Based on the previous research evidence, the nonsignificant results that were found in the present study were not expected.

The CTES questionnaire used in the present study assessed the spectrum of childhood traumas in brief detail. The analyses examined the results of trauma exposure as a general phenomenon rather than separately analyzing each type of trauma assessed. As research demonstrates, childhood sexual abuse and neglect are commonly associated with long-term consequences and are frequently mentioned in the literature (Mandelli et al., 2015; Spinhoven et al., 2016). More in-depth analyses of each type of childhood trauma, and more in-depth accounts of individual perceptions of trauma intensity, would help clarify the true nature of this relationship.

As with the majority of studies, the design and results of the present study are subject to limitations. The cross-sectional nature of the study lacks predictive power in that it cannot account for and measure later behavior (Bland, 2001). This fails to accurately measure whether participants' psychopathic traits remain consistent over time; in addition to response inhibition levels that can degrade throughout the lifespan (Borella et al., 2008). However, it is the case that the majority of studies in this area utilize cross-sectional designs and effects have still been found. Nevertheless, a temporal relationship between trauma exposure and any observed effects is central in this area of research and should be investigated.

It is evident that further studies are needed to explore this area thoroughly. Further research may utilize other methodologies, sample populations, and study designs but must ultimately aim to expand the findings of the present study to ascertain why the results found occurred and whether future research can support or refute the relationship between childhood trauma, response inhibition and psychopathy.

Furthermore, future research should strive to investigate each type of childhood trauma separately, for example the possible effects of childhood sexual abuse or childhood neglect on later functioning to determine whether effects may be observed. Current research has shown that complex trauma – that which is multiple and persistent – to have more of an adverse effect on later functioning, particularly in relation to depressive and post-traumatic stress diagnoses (Op den Kelder et al., 2017). In their study, youth exposed to single trauma reported less deficits in executive functioning compared to the complex trauma group and as a result executive functioning was only found to mediate PTSD symptoms for the complex trauma group. As the present study's focus was that of trauma in general, regardless of type; the results found may not necessarily align with that of future studies if the scope was on the effects of complex traumas. It may have been the case that the sample in the present study contained a significantly larger proportion of single trauma participants that skewed the results in a way to result in nonsignificant findings. Consequently, future studies should aim to test the effects of both complex and single traumas in later functioning separately to ascertain whether effects can be found.

Methodological triangulation whereby qualitative methods are also employed to explore participants' experiences of their childhood events may provide further insight into how individuals perceive their childhoods as traumatic or not and which events they regarded as more traumatic. Though events such as the death of a parent or personal illness are regarded by many measures of childhood adversity as traumatic (Pennebaker & Susman, 2013), whether this is categorized as a traumatic event by an individual is not certain. Thus, trauma experience is a complex and subjective phenomenon that may only have an effect on an individuals' later behavior if the victim processes the event as traumatic.

Conclusion

The present study aimed to investigate the presence of a relationship between childhood trauma and psychopathy, as well as a relationship between childhood trauma and response inhibition. Data analysis revealed no significant role of self-reported childhood trauma in predicting psychopathic traits or response inhibition. These findings add further insight into our understanding of susceptibility to a range of psychological disorders and executive function impairments. Future directions for research should strive to establish the specific nature of the relationship between traumas, perceived traumas, and executive function development. Ultimately, the research provides an insight into previously undescribed consequences of trauma exposure that may assist in the awareness and education of adverse childhoods for later psychological wellbeing.

Funding statement. This work received no specific grant funding from any funding agency, commercial or not-for-profit sectors.

Conflicts of interest. None.

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